CLAIMS

1. A method of collecting a microorganism or a cell from a liquid sample, comprising:

bringing the liquid sample into contact with water-absorbing resin so that a liquid phase part of the liquid sample is absorbed by the water-absorbing resin and the microorganism or the cell is caught on a surface of the water-absorbing resin.

2. The method according to claim 1, wherein after the liquid sample has been brought into contact with the water-absorbing resin, a collecting solution further is brought into contact with the water-absorbing resin to collect the microorganism or the cell caught on the surface of the water-absorbing resin in the collecting solution.

3. The method according to claim 2, wherein a centrifugation tube comprising a filter that divides an inner space of the tube into an upper part and a lower part and water-absorbing resin particles disposed on the filter is provided, the liquid sample is poured into the centrifugation tube to bring the liquid sample into contact with the water-absorbing resin particles, the collecting solution is then poured into the centrifugation tube to bring the collecting solution into contact with the water-absorbing resin particles, and the centrifugation tube is centrifuged so that the collecting solution passes through the filter to move toward a bottom of the centrifugation tube.

4. The method according to claim 3, wherein the centrifugation is performed at 500 to 13000 g for 3 seconds to 60 minutes.

5. The method according to any one of claims 1 to 4, wherein an amount of the liquid sample added is not greater than a water-absorbing capacity of the water-absorbing resin.

6. The method according to any one of claims 2 to 4, wherein the amount of the collecting solution added is greater than a water-absorbing capacity of the water-absorbing resin that has absorbed the liquid phase part of the liquid sample.

7. The method according to any one of claims 1 to 5, wherein the water-absorbing resin is a hydrophilic cross-linked polymer having a hydrophilic functional group.

8. The method according to any one of claims 1 to 7, wherein the microorganism to be collected is at least one selected from the group consisting of acid-fast bacteria, atypical mycobacteria, gonococcus, legionella bacteria, mycoplasmas, spirochetes, syphilis spirochetes, chlamydiae, rickettsiae, *Mycobacterium leprae*, Spirillum minus, staphylococci, streptococci, *Escherichia coli*, *Pseudomonas aeruginosa*, *Pasteurella pestis*, viruses, Japanese encephalitis virus, hepatitis B virus、hepatitis C virus、ATLV, HIV, and Ebola virus.

9. The method according to claim 8, wherein the acid-fast bacterium is at least one selected from the group consisting of *M. avium*, *M. intracellularae*, *M. gordonae*, *M. tuberculosis*, *M. kansasii*, *M. fortuitum*, *M. chelonae*, *M. bovis*, *M. scrofulaceum*, *M. paratuberculosis*, *M. phlei*, *M. marinum*, *M. simiae*, *M. scrofulaceum*, *M. szulgai*, *M. leprae*, *M. xenopi*, *M. ulcerans*, *M. lepraemurium*, *M. flavescens*, *M. terrae*, *M. nonchromogenicum*, *M. malmoense*, *M. asiaticum*, *M. vaccae*, *M. gastri*, *M. triviale*, *M. haemophilum*, *M. africanum*, *M. thermoresistable*, and *M. smegmatis*.

10. The method according to any one of claims 1 to 9, wherein the liquid sample is at least one selected from the group consisting of sputum, spinal fluid, feces, saliva, blood, tissues, swab, liquid obtained by gastrolavage, urine, samples obtained by pretreating these biological samples, water in baths, water in swimming pools, water in fish farms, water in rivers, lake water, and seawater.

11. The method according to claim 1, wherein the amount of the liquid sample is in a range from 50 μL to 500 μL.

12. The method according to claim 1, wherein the amount of the liquid sample is in a range from 50 mL to 200 mL.

13. An implement for collecting a microorganism or a cell used for the method according to claim 3, comprising a centrifugation tube,

the centrifugation tube comprising:

a filter that divides an inner space of the centrifugation tube into an upper part and a lower part; and

water-absorbing resin particles disposed on the filter.

14. A method of amplifying or detecting specifically a gene of a microorganism or a cell, comprising:

collecting a microorganism or a cell by the method according to any one of claims 1 to 12;

extracting a gene of the microorganism or the cell by adding an extraction reagent solution containing a nonionic detergent to the microorganism or the cell and heating the resultant mixture; and

amplifying or detecting specifically the extracted gene.

15. The method according to claim 14, wherein the extraction reagent solution also serves as the collecting solution.

16. The method according to claim 14 or 15, wherein the heating temperature is not lower than 70°C and lower than 100°C.

17. The method according to any one of claims 14 to 16, wherein the heating is performed for 1 to 30 minutes.

18. The method according to claim 14 or 15, wherein the heating is performed at 96°C for 10 minutes.

19. The method according to any one of claims 14 to 18, wherein a pH of the extraction reagent solution is in a range from 7.0 to 12.0.

20. The method according to any one of claims 14 to 19, wherein a concentration of the nonionic detergent in the extraction reagent solution is in a range from 0.01 to 10 wt%.

21. The method according to any one of claims 14 to 20, wherein the nonionic detergent is at least one selected from the group consisting of D-sorbitol fatty acid esters, polyoxyethyleneglycol sorbitan alkyl esters, and polyoxyethyleneglycol p-t-octylphenyl ethers.

22. The method according to any one of claims 14 to 21, wherein the extraction reagent solution further contains a metal chelating agent.

23. The method according to claim 24, wherein a concentration of the metal chelating agent in the extraction reagent solution is 0.1 to 100 mM.

24. The method according to claim 22 or 23, wherein the metal chelating agent is at least one selected from the group consisting of ethylenediaminetetraacetic acid (EDTA), ethylene glycol bis(β-aminoethyl ether)-N,N,N',N'-tetraacetic acid (EGTA), diaminocyclohexane tetraacetic acid, o-phenanthroline, and salicylic acid.

25. The method according to any one of claims 14 to 24, wherein the gene is amplified or detected specifically by a polymerase chain reaction (PCR) method.